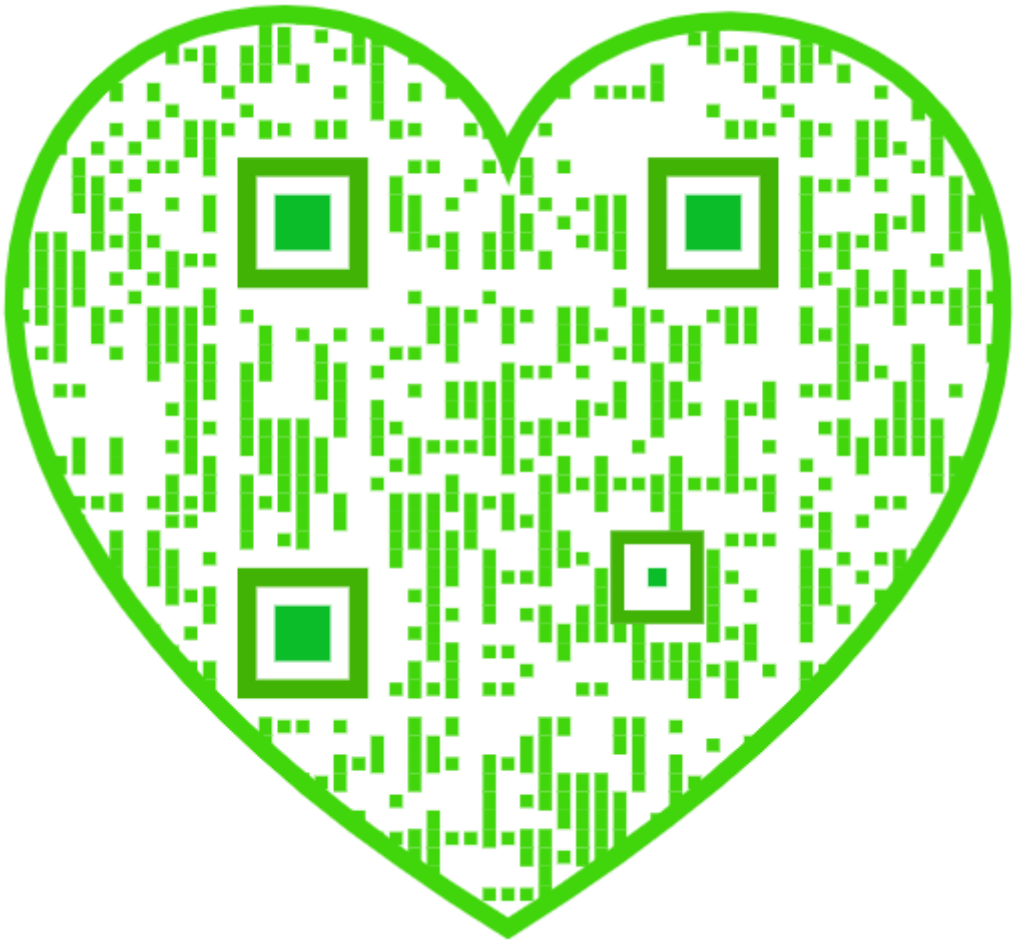

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OBJECT-TEACHING;

OR,

WORDS AND THINGS.

BY

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A STUDY IN APPERCEPTION.

or "A Pot of Green Feathers," by Mr. Rooper, a very valuable little book of the same size and price. It discusses the mental operations by which we acquire knowledge.

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PREFACE.

I HAVE attempted in the following pages to introduce English readers to a group of German thinkers who have worked out theoretically and practically the bearing of certain important philosophic principles on practical education.

Many experienced parents and teachers hold that the training of young children is far better conducted in the absence of leading principles to guide it. They point out that there is no reason to suppose that the most successful teachers have been students of philosophy, and they infer that a study of philosophic principles is of no consequence to a teacher.

It appears to me, however, that they who argue thus mistake the function of philosophy. German writers on education have not sought to reveal some new and untried methods of teaching, but rather to study the causes of success where success has been attained. After making due allowance for the magic influence of genius in a great teacher (which of course dies with him except for its indirect effects), it is still possible to ascertain how he actually taught with the view of finding out as much as may be of the secret of his success. Such research is worth while, because even if it appear after all that the

great man's influence on his pupils was really a kind of magic or legerdemain, and as such inimitable, nevertheless it is interesting to know how the trick was done.

Few, however, will really doubt that it is possible to disentangle a few leading principles which lie at the basis of successful teaching. It does not, of course, follow that because a teacher is acquainted with these principles he will be able to apply them with effect, but the knowledge will certainly aid him in his difficult task. Teachers, like poets, are "born, not made;" but whereas no one is a poet on compulsion, all parents are compelled to be teachers, and a vast number of others besides parents must undertake the training of children without being especially endowed by nature with a genius for education.

The reason why one teacher can keep up the attention of a class in a lesson on Greek irregular verbs while another sees the attention of his class wandering in the midst of a lesson on Hannibal and the Romans appears to be thought by some an insoluble mystery and by others a mystery not worth solving. For myself, I believe that the studies of German writers on education help to solve such mysteries, and I hold that in the interest of childhood they are worth solving. My hope is that the following brief lecture may direct the attention of others engaged in teaching to an inexhaustible gold-mine of educational philosophy in which I have dug with great profit to myself.

T. G. Rooper.

"The Elms," High Harrogate,
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OBJECT TEACHING, OR WORDS AND THINGS.

"Her eyes are open;
Aye, but their sense is shut."—*Shakespeare.*

On a particular occasion during the recent visit of the Empress of Germany to London it became the duty of the reporters of the public journals to describe Her Imperial Majesty's dress. Subsequently the *Globe* collected the descriptions of the costume as they were given by different reporters, to this effect:

The *Times* stated that the Empress was in "gold brocade," while, according to the *Daily News*, she wore a "sumptuous white-silk dress." The *Standard*, however, took another view: "The Empress wore something which we trust it is not vulgar to call light mauve." On the other hand, the *Daily Chronicle* was hardly in accord with any of the others: "To us it seemed almost a sea-green, and yet there was now a cream and now an ivory sheen to it."

The Pot of Green Feathers.—No wonder that the *Globe* asks emphatically, "What *did* the Empress wear?" This incident seems to me another illustration of what I tried to explain in a brief paper, which I named, "The

Pot of Green Feathers." I tried to prove in that paper that we do not, as common-sense is apt to suppose, learn directly from an object that lies before us nearly as much as we seem to do. I showed that the mind of the beholder, with its existing stock of ideas, adds to the impressions which it receives from the object as much or more than it actually receives from them. Many impressions which seem to enter the mind directly from the object really make their way in only mediately, as the result of inferences and combinations made by the mind itself. Something is supplied by the object and something else is supplied by the mind.

The consequence is that our knowledge of an object is not, as it seems to be, entirely determined by the object, and the statement that "the senses are the gateways of knowledge" must be accepted as one which conveys only a partial truth. "What," says somebody, "can I not believe my own senses?" "Certainly," I reply, "but only if you carefully distinguished between the actual gifts of the senses and your inferences from those gifts." The process of interpreting impressions was popularly explained in the aforementioned paper, but those who wish to see the question much more philosophically treated should read Mr. Stout's article on Apperception in a recent number of *Mind*. I propose in my present paper to assume a knowledge of this process, and to proceed a little further in the application of psychological principles to educational practice. My intention is to explain what I know of Object Teaching—that kind of teaching which ought to be the foundation of all learning, however abstract and advanced.

Object Teaching not Information Giving.—Object Teaching has so much in common with other kinds of teaching, especially with language lessons and information lessons, that it is frequently confused with them. The distinction between them is, however, of the utmost importance, and the true nature of Object Teaching can hardly be made clear without drawing the distinction.

Its Relation to Language Teaching.—My first point, therefore, will be to show what Object Teaching has in common with language teaching, or in other terms, the relation of Words to Things.

The Process of Apprehension is from the vague "Whole" to a "Whole" made definite by a Knowledge of its Parts.—If an object be presented to our eyes for the first time we cannot at once obtain a clear vision of all its separate parts and qualities. By fixing our attention we become aware of a number of different parts and qualities, which we make out one after the other in more or less rapid succession; but the mental image of the object which we obtain in this way is far from clear or well defined. The object as it is first viewed by the inner vision is like a mass of hills in a sea of mist. Just as the numberless summits are there massed together into one ill-defined elevation of land, so the parts and qualities of the objects are massed together into a vague multitude about which we can say little that is precise.

There must be Analysis.—The process of arriving at definition and precision is one of analysis. Out of the confused mass of impressions, first one emerges into clearness, and then another, until the division of the whole is as complete as our mind can make it. The

process of analysis of an unfamiliar object is far from easy, because each separate quality and part exists in the object as a portion of an undivided whole.

Example.—A piece of lump-sugar, for instance, is to a young child a composite whole which he cannot analyze for himself. Older persons can say that it is white, hard, sweet, sparkling, and crystalline; but we cannot present to the child the whiteness, or the hardness, or any of the other qualities as separate objects outside and independent of the lump. We can only place beside the sugar other white things, such as salt, milk, fat, cotton, and direct attention to the quality which they have in common, namely, whiteness. In this way only we can guide the child to make for itself the mental effort which is needed for reaching the abstract conception whiteness, and if we wish to lead him to the conception of hardness, sweetness, and the rest, we must proceed in the same way.

1. **Words Aid the Analysis of an Object.**—The process seems to prove that language is practically essential for success in such acquisition of knowledge, and the truth is, as we shall see more and more clearly in the sequel, that apart from "words" there are for human science no "things," because the analysis of a whole into its parts can proceed but a very little way without words. When we take notice of the various parts and qualities of an object, and give each a name successively, what is there to fix these parts in the mind as complements of one whole, but the name which we give to the whole object? Essential as the word is for analysis, it is quite as

necessary for synthesis—that is, for reuniting in thought what our thought has separated.

2. **They Assist to Separate the Object from the "Ego."**—There is another mental process which the word greatly assists. In the presence of a new object, if it is sufficiently startling in its nature, we forget ourselves and are lost in the object. Self-consciousness vanishes. We can no longer say "That is an object, and this is I." We are in that strange condition of mind which supervenes when we witness a fine soliloquy well acted on the stage—say, Hamlet's "To be or not to be," or a love scene. If the actors are really successful, the scene before us does not seem to be going on in our presence. The thought of ourselves as present would be a disagreeable feeling of intrusion.

Examples.—In certain states of mind the inner and outer are blended into one. When the consciousness of the distinction between the "I" and the "not I," that is, between the "I" and the object, begins to arise, it is language which defines and renders permanent the distinction. Disturbed by a sudden peal of thunder in the night, we wake in a confused state of mind till the word "thunder" occurs to us, and seems to extricate us from the feeling of "not knowing our own selves."

3. **Speech is an Outward Expression of the Result of an Inward Mental Process.**—In this way it comes about that speech may be regarded as an act of deliverance for the understanding. When from amidst the whirl of sensations which crowd in upon it, or from the overpowering effect produced by a single group of impressions, the mind has obtained mastery over itself and reduced

confusion to order, there arises a feeling of triumph which finds expression for itself by means of words, and often by gestures as well. The internal sense of victory reacts upon the body, and the body reflects the feeling of the mind. The reaction of the mind on the bodily organism causes the utterance of the word, and now there are present in the consciousness two things—the object known and the utterance of the sound or the name of the object.

Object and Word become Associated.—These two are intimately associated, and so strong is the association that afterwards one alone, if both are not present, calls the other into consciousness. I see, for instance, a lake before me, and I cry "Windermere." Or I read of Windermere in a book, and I think at once of my mental image of the lake; I see a view of the lake in my mind's eye.

When Words are Significant.—This association occurs where the knowledge of the object and of the name of the object have been associated in acquisition. Where word and object are thus associated the word is in a special way the mark or indication or sign of the object, and such words are significant words in a special sense of the word significant. The utterance of them is weighted with a mental reproduction of the thing signified, and it is by no means so rapidly or so easily made as the utterance of a word that reproduces no mental image, and is a mere sound. If words were more significant in this sense than they are to most people, orators would use fewer of them; for really significant words, inasmuch as they thus carry weight, pass much

more slowly through the mind than the others which are as empty ships that float lightly and sail quickly, owing to the absence of cargo.

4. **The Word Mediates.**—The word then mediates between the mind and the object. The object is without us, and the knowledge of the object is within us. Between the inner and the outer, that is, between the object and our knowledge of the object, comes the word as a support to the mind in mastering the object. By means of the word the mind can set itself opposite to the object, and separate itself from it more completely than during the actual contemplation which precedes recognition of an object.

Double Nature of the Word.—The spoken word is well suited for mediating between mind and object, because of its double nature. It is on the one hand physical and outward, being the product of the bodily organism; and on the other hand inward and immaterial, because it is called into being by the mind, and expresses an inward impression. Inasmuch as the nature of the spoken word is inward, it is related to inward impressions; but inasmuch as its nature is also outward, being a physical thing, it helps the mind to present to itself its inward impressions as outward objects.

Pleasure in Gaining a Word for an Object.—Every one may notice that as soon as a young child has once recognized and named a particular object (no matter whether he invents a name for himself or imitates his mother), he loves to keep on repeating the name as often as he sees the object. The pleasure of recognition is marked by the utterance of the word.

5. **Names serve as Points around which to Group Knowledge.**—However long we regard an object, we do not take in all that can be known about it, but only so much of it as we ourselves are able to comprehend. A name, in the same way, does not indicate all the qualities of a thing, but only the most prominent. The baby child calls his dog "bow-wow;" that is to say, one single lively impression, that of barking, is named and taken to represent a large collection of impressions. A number of separate impressions are by means of the word "bow-wow" converted into a concise whole, and in place of several separate items of observations made successively and often at long intervals, we now have in the word or name a brief summary of them recalling the whole.

The word which thus summarizes for us what we know of an object serves as a fixed point around which we can group all else which we may afterwards learn about the object.

Example.—The child hears the dog bark, and sees it run, jump, pursue, catch flies, and worry the cat, and the name dog in the end calls up all these qualities. Then inasmuch as the child sees other dogs behaving like his own, he uses the name dog to describe the whole fused mass of similar impressions, and "dog" becomes a class name. Every fresh impression about a dog which the child acquires is associated with the name "dog," which thus collects a wider and fuller meaning. The word then may be regarded as a net spread by the mind to catch the results of new observations and retain them.

Another Example.—The word "mountain," for in-

stance, remains the same, although after seeing the Lake Mountains in England, the mountains of Central Europe, and the Swiss Mountains, my conception of the thing changes very considerably.

Original Meaning often Lost.—Words in this way lose something of their original meaning. "Wolf" meant originally "the tearer," and "mouse" meant "the thief." "Lady" meant (perhaps) "bread-kneader." Who thinks of such meanings now? Thus it is clear that the current meaning of a word often depends upon the connection in which it is used at the time, and not upon its etymology, as is amusingly shown in the little invitation and acceptance of two French ladies which I read lately in a French comic paper: "Voulez vous *five-o'clocker* chez mois?" "Avec plaisir. Mais à quelle heure?" *

Recapitulation.—The word then, briefly to resume its uses, aids us to analyze an object into its component parts. We look at a dog and see it sometimes running, sometimes sleeping, sometimes black, but in every different case we see the dog as a whole. Our eyes do not divide for us the thing dog, and the action running. It is by use of the word dog that we are able to separate in thought the object dog from its various properties and activities. The more searching and varied our observations, and the more we increase our knowledge of these properties of an object, the richer becomes the significance of the word, and the more refined and definite becomes our knowledge of the thing.

* "Will you take five-o'clock tea with me?" "With pleasure. But at what hour?"

Conclusion. All good Object Lessons are also good Language Lessons.—By use of the word again, we can group together many different but similar impressions. We call many shades of green—apple, emerald, sage, and grass—all green. Words help us to restore to consciousness at pleasure past impressions of objects, and make it possible for us to recall particular impressions out of a cumbrous or perhaps ill-defined mass. Words give us a mastery over our stores of past impressions which we should not possess if the whole of every object had to be recalled every time we wished to speak of it, instead of so much of it as is sufficient for our immediate purpose. By words we can study the properties of things independently of things themselves, and by words we can arrive at the conception of general ideas and enter into the domain of science. Without words we can look at objects and know them as animals do, but we can have little or no science. Object teaching should bring us into ever closer touch with objects; but to effect this contact the right use of the right words is indispensable.

The Importance of Formal Grammar in Elementary Education has been Overestimated.—But you may say, "If you insist so much on the importance of language, why do you attach so little importance to formal grammar as a class subject?" My answer is, that there is a wide difference between learning a foreign language and learning your mother tongue. Grammar lessons in connection with his mother tongue are commenced long after the child has learnt to talk and read it. The function of the grammarian in dealing with the gram-

mar of his own tongue is to take the language as he finds it used, and note its agreement with or variation from the laws which govern human speech; and, as far as possible, to explain discrepancies.

Formal Grammar of Little Value so long as only the Mother Tongue is Studied.—It seems, however, that this study is hardly possible until the student has learnt some other language besides his own with which he may compare its usages. Those will speak the purest English who converse with people whose diction and pronunciation are sound and clear, and whose vocabulary is ample and correctly used. Following rules of grammar when you are acquainted only with your mother tongue leads to as many mistakes as it cures. For instance, the rule that adverbs and not adjectives modify verbs, as "I write badly," not "I write bad," leads students to say "I feel badly" when they do not mean to complain of their power of feeling, but to describe their own physical condition. A describing and not a modifying word is, therefore, wanted. They ought to say, "I feel bad," "I feel sick." "You look sad" again has a different meaning from "You look sadly."

Every Child should Learn a Foreign Language.—Command of English, therefore, is gained by constant practice, by attending to the corrections of some one who has a good acquaintance with the current use of it, and by reading well-written books. To learn enough of grammar to parse "*he would have written*," is a lengthy process, and the time which it requires may more usefully be spent in different studies. I have noticed in

looking over papers in grammar and composition, that a sound knowledge of grammar is quite consistent with undeveloped powers of writing and understanding plain English. To bring it so far as to distinguish the parts of speech and to analyze sentences hardly deserves to be called learning grammar; but so much probably every child would learn in the lessons on composition. I think, however, that every child ought to learn some foreign language, and then the study of formal grammar becomes much more useful.

The Study of Objects Fundamental.—The study of objects is the forming correct impressions from objects which are actually presented to the senses; and though it is the lowest stage of intellectual development, it is the foundation. Man shares this study with animals, but it is the base of his whole mental superstructure. The mind has no ready-made knowledge of things and no innate ideas or conceptions. At the most it has aptness for acquiring them. Step by step, by daily contact with the outer world, by action and reaction of itself on objects and of objects on itself, by the reception of impressions and by the elaboration of them through internal processes, the mind wins its laborious way to that degree of intellectual, moral, and spiritual elevation of which it is capable.

Importance of Correct Impressions.—The main business of the Object Teacher is to enable the learner to form correct impressions, and there is no more important branch of instruction. Like the reporters, we look at a lady's dress. We then shut our eyes and try to recall what we saw. We have in our mind a mental im-

age of the dress. Similar mental images are the starting-point of all knowledge. If the impression first received is wanting in clearness and precision, if the mind cannot assimilate the impression, or if it cannot express in words what the impression is, as in the case of the same reporters, the mental image will not be an improvement upon the impressions on which it is based, but will be full of confusion and obscurity.

Trained Attention the First Requisite. — A clear mental image can only be formed by trained attention to impressions from objects, by which the parts and characteristics are carefully grasped and impressions nearly alike clearly distinguished from impressions really alike. Vague, obscure, and shifting impressions of an object will never help us to know it rightly, however frequently they are made. Four reporters take note of a dress and are at variance in describing its color.

Names which recall Inexact Mental Pictures lead to Inexact Reasoning.—Another reason for the need of trained attention to impressions is to be found in the fact that our mental image of a particular object, when provided with a name, soon passes from being particular and individual, and supplies us with a conception of a class.

At first we name a particular animal dog. We afterwards think of all kinds of dogs under the name dog. Any particular dog which we note is seen in connection with many special characteristics, such as size, color, action, and the like; whereas our general conception of "dog" only retains the most general impressions. The

content of the class name—the name dog as applied to all individual dogs—must needs be much more vague and indefinite than the same name when applied to a particular dog which we are looking at.

Our general notions, therefore, although based on impressions from objects, can never be as clear and full and free from vagueness as the result of the original studies of particular objects upon which they are based. How important, therefore, that the study of such impressions of individual objects should be as exact as it admits of being made; for otherwise our conceptions are like a copy of an ill-drawn picture, which besides suffering from the defects of all copies has this additional disadvantage, that it exaggerates the original imperfection of the first picture.

Good Object Teaching Leads to (1) Accurate Perception and (2) Accurate Description.—The trained use of the senses is necessary not only to the man of science, whose pursuits are wholly based on the study of objects, but to the artist, who needs a vivid and accurate perception of all the parts and relations of the objects which he represents, and even to the ordinary artisan, if he is to introduce into his work any original thought or design. By the early training of the senses a man may learn to look out for what is new in objects, and to find it where the less carefully trained sees only what is familiar. The link between the inner world of the mind and objects, or the outer world, is speech. Speech is a spiritual hand for grasping objects by the mind. By words we fix in our minds our own impressions, and by words we communicate them to other people. Words

express the relation of our consciousness to objects, and we mostly comprehend objects as words present them to our minds. Want of language, want of words filled with clear, definite meaning, is the greatest hindrance to culture.

Object teaching, then, should, in connection with language teaching, form the children's conceptions, and supply them with a good store of significant words, together with a knowledge of the right way to apply them. Object teaching places children closely in contact with nature and human nature, the two sources of human knowledge and moral experience. There is a knowledge of words which is really a knowledge of things. Object teaching is the reconciliation of the old antithesis between them.

METHOD OF OBJECT TEACHING.

1. **Divide the Object into Parts.**—Having described the end and aim of Object Teaching I now come to its method. The key to the art of training the senses is analysis. An object presented to a child for the first time gives him a confused sense of impressions. The child must be shown how to divide this whole into convenient parts in an orderly manner. His attention must be directed first to one part and then to another, and afterwards the bearing of one part on another must be carefully worked out.

2. **Reunite the Parts into the Whole.**—After this analysis or study of detail the object must be again studied as a whole. It should never, after being thus

pulled to pieces, be left in fragments as it were, but the careful division of the separate parts should be followed by a reconstruction of them into the original whole. Such an attentive study of an object must replace the hasty, fugitive, and unstable glance which usually satisfies a child. In studying an object it should not be forgotten that in nature things are not separate and independent existences; the attention must not be so wholly confined to the object and its parts as to allow the child to forget its relation to other things. Let the child see what part the object plays in its usual surroundings, and dwell upon its material, its origin, its use, its hurtfulness, its opposites, and its resemblances.

The Aim of Object Teaching is to furnish the Child with a Method of acquiring Knowledge for Himself.—Even children can study a particular object thoroughly up to a certain point, and the habit thus acquired extends itself to objects which are not treated of by the teacher in school. In fact the right sort of object teaching develops a faculty of study which is of infinitely more consequence than the actual information obtained. The faculty which is developed is of universal application, while the knowledge of the object studied in developing it is necessarily limited and restricted. If I have studied with attention a very few of the manifestations of the effects of gravity and have really assimilated them, I am able to study other forces with greater ease. The use I can make of my knowledge depends not so much on what I can write down in an examination—often a cumbrous and superfluous store—as upon the way in which I have been taught.

Object Teaching demands Time.—Teaching of this kind cannot be a hasty process. Time is needed for the mind to play freely over the object, and time is needed for recapitulation. After each part or characteristic has been considered separately, it should be again reconsidered in relation to the whole. As there are three characteristics of good powers of observation which the detailed analysis of an object tends to promote—namely, speed in responding to impressions, infallibility in interpreting them, and exhaustiveness in examining their origin; so there are three advantages which recapitulation secures—namely, vividness of the mental image, strength and mental hold upon it, and versatility in employing it.

Test the Growth of the Child's Knowledge of an Object by his Power of Expressing it by Drawing and Modelling.—Necessarily, therefore, in true Object Teaching the object must be kept frequently and long under the child's notice, and his memory must be checked by repeated comparison of his mental image with the actual object.

Hence drawing—that best external evidence of the inner mental image—or modelling, should be resorted to as early as possible. Even a very young child would early learn to reproduce from memory the shape of a particular ivy leaf, and then match the drawing or model with the original. The temptation of the teacher is to trust to the child's memory, which is usually a perfect lumber-room of confused and inaccurate impressions. The object should be withdrawn from sight bit by bit while it is being studied. Where it is proved

that the child has a vague or inaccurate notion of any part, let that vagueness be cleared away by fresh reference to the object. In this way the carrying power of the memory is surely, if slowly, increased. One of the ablest specimens of Object Teaching in its elementary stage is printed in Mrs. Sewell's Life, and I can give no better illustration of my meaning.

AN EXAMPLE OF OBJECT TEACHING.

A little boy—we will say about four years old, runs from the garden to his mother.

"Oh! mother, do come and look at this beautiful thing on the rose-tree; I want to know what it is."

"I am busy now, Charles; tell me what it is like. What color is it?"

"Red, I think."

"Oh, I suppose it is a ladybird."

"Oh no, it is a great deal bigger than a ladybird."

"Well, perhaps it is a tiger-moth, that has two red wings. Look, like this"—and the mother slightly sketches the tiger-moth on the slate.

"Oh no, it is not at all like that."

"Is it this color?"

"No, it is not so red as that."

"Perhaps it is the color of this mahogany chair?"

"No, not just like that."

"Perhaps like this nut?"

"Yes, it is very much like that."

"Well, this is light brown, not red. But what shape is this beautiful creature?"

"Oh, I think it is round."

The mother draws a round figure on the slate. "Is it like this?"

"No, not so round."

The mother makes a long thing in the form of a long caterpillar.

"No, it is not so long."

The mother then draws an oval.

"Yes, it is very much like that."

"And has it no feet?"

"I think it has some feet."

"How many? I suppose two feet like the birds. Are they like these?"

"Oh no! I am sure they are not like those."

"You had better go and look at it again, and come and tell me."

"Mother, it has six legs."

The mother draws two on one side and four on the other. "Is that right?"

"No, it has three on each side."

The mother corrects it. "Is that right?"

"Yes, that is really right."

"You will see by this example," said Mrs. Sewell, "how much of accurate observation this lesson will have taught the child. Children will never weary of this sort of instruction, and it is impossible to calculate how much the child will gain; very soon he will endeavor to guide his mother's fingers to the correct form, and next endeavor to form the figure himself. The value of the habit of accurate observation is not to be told. In this way a child obtains the power of using

his own mind, and he learns the value of correct language and description.

"Had the mother simply complied with the child's request, and gone into the garden and said 'That is a stag-beetle,' the subject would have been closed and the child's interest quenched. Had a servant been with the child she probably would leave the question thus, 'Oh, that's a nasty beetle; don't touch it or it will kill you with those great nippers; come away from it.' Then the child would not only have its interest quenched, but would be taught to fear a harmless insect, and the creature would become an object of disgust."

The Difference between Object Lessons and Information Lessons.—If then Object Teaching be what I have attempted to describe it, the instruction must commence with an object or specimen. To talk to the children about things not seen during the lesson is not Object Teaching. Again, a conversation about all kinds of things in a superficial way is certainly a valuable lesson for a certain purpose. It conveys general information and corrects a tendency to pedantry, which is the besetting sin of all school work, but it is not Object Teaching. Talking over many things is not the same in effect as talking of nothing, but it is practice in conversation, the use of words, mustering ideas, quickness in recalling past impressions, and grammar, rather than training the powers of observation and attention or laying the foundation of knowledge by developing the faculties which we possess for attaining knowledge.

Object Teaching must Train the Senses. — Nothing should be called an object lesson which does not im-

prove the senses of the child and make him able, of himself, to advance in the true path of acquiring knowledge. The information conveyed in chats and lectures ends with the passive reception of it. The child is suffarcinated with facts like the Strasburg geese, but the facts are not imparted in such a way as to form the starting-point of further learning or to lay the foundation of a method of observation and research.

In concluding this brief account of the theory of Object Teaching, I ask, What is the aim of Object Teaching? Is it talk? Is it the mastery of language? Is it the mustering of ideas? Is it conveying general information? All these kinds of instruction are needed, but they are not properly Object Teaching. This begins with a keen, many-sided, and accurate observation of a familiar specimen.

A Specimen Lesson.—You may now fairly challenge me to give some concrete instance of what I consider good Object Teaching. "These are very fair philosophies of yours, no doubt," it may be urged, "but unless you reduce your theories to practice, how can we be sure that they are not like the proverbial horse which is a very good steed in the stable but an arrant jade on the journey?"

After some consideration I have chosen as the subject of my lesson the common duck, not that I mean to make up one adapted only for infants, for I intend it for children over ten years, but because of its familiarity and the ease of procuring a specimen. Of course the compilation is intended to take up much more than one

lesson time, and I can only give you the matter of the lesson, as it would take too long to show the method.

A Lesson on the Duck.—In a lesson on the duck I should avoid commencing with its Latin name (*Anas boschus*), its ornithological classification, and its history under domestication, and I should prefer to take first of all what we see of it ourselves. The children must be made to visit a pond, where there are ducks very frequently—the first time with their teacher, and afterwards by themselves; and the points which I state as facts should be gained by questioning the class after they have been to the pond and watched the ducks. A live duck should also be brought into school from time to time.

The Duck's Body. — Where does the duck live? Mostly in the water, even in winter. If we swam about in water which was nearly freezing we should be starved with cold. What is the difference between us and the duck? The duck has feathers and we are without such covering; and further, the legs and feet of the duck are not made like ours. They do not contain so much blood. Compared with ours they are less fleshy, and expose less blood to the surface where it gets chilled by air or water.

Now let us examine the duck's clothing of feathers. On the sunny side of a pond we can pick them up in numbers. Are they all of the same size? No, some are smaller than others. Let us examine a large feather. It consists of two parts, a firm stem which at one end is inserted into the skin, and at a certain distance above the end branches spread out on two opposite sides. We

call the stem the quill, and make pens of them, as goose-quills and crow-quills. Note that in the larger the branches cling to each other closely. In the smaller they are separate and fluffy. Which are softer? Which do we make beds of? The difference we mark by a name. The small feathers we call down.

Now look at the duck's body. Which feathers are outside? We cannot see the down until we pluck off the feathers. The down clings close to the body; and notice the lower and inner part of some of the large feathers is also downy. Thus the duck has undercloth-ing as well as a dress to wear. These two coats keep it warm even in cold water. (The difference between the circulation and the breathing in birds and mammals should be introduced when the children are more ad-vanced.)

Now look under the duck's skin. There is a layer of yellow fat. (What people live on fat and smear them-selves with fat? Why?) So the duck is kept doubly warm.

Does the water soak the duck's feathers as it swims? Any lady who has a feather in her hat fears the rain will spoil it, and so it does. The water hardly wets a duck's feathers. Note how it slides off a duck's back in drops like peas. How is this?

First look at the arrangement of the outer and larger feathers. They lie close pressed together and overlap each other like tiles on a roof, off which the water flows from one to the other without getting between them, and the outer feathers protect the downy inner ones. If the wind is blowing and the rain falling, the duck

swims to meet the wind, and the penthouse of feathers is so arranged as to have its free and weaker end turned away from the wind. We see how easily the water drops off the feathers, but if you look at the tiles of a roof you will see that they get wet in a storm though the people beneath remain dry.

Do the duck's feathers themselves get wet? Try. Take a feather which has recently been dropped by a duck, and wet the upper side of it. It keeps dry like oiled silk. The reason is that it *has* been oiled. Where does the oil come from? Is it exuded from all over the duck's body? If this were so the down would be oiled, which lies nearest the body. But the down, unlike the larger feathers, does get wet if you put it in water, as you see, and so the source of the oil cannot be in the general surface of the skin.

Now watch the duck on a sunny day, either when it is sitting on a sunny bank or when it is floating about on the calm surface of the water. Sometimes it is sleeping with its head under its wing. Sometimes it works its bill about, now moving it in the feathers near the tail, and now, as it were, smoothing down the other feathers of its body. The duck has a wart-like excrescence near the root of its tail, and this body secretes oil, which the duck, by use of its bill, smears over the feathers to make them waterproof.

Now watch the duck on the pond. When a dog swims it sinks all its body in the water as far as its neck, and so does a horse, and so does a man, and what is more, all of these never cease moving their limbs, in order to keep their heads above water. The duck swims

on the surface of the water more like a cork, and can float without moving a muscle. Now what makes a cork swim so lightly? Look at it. A cork is full of holes, and the holes are full of air. Look how lightly a bladder full of air floats. Is the duck full of air?

Let us examine a duck more closely, and look inside it as well as outside. First compare the flight feathers of the wing, the tail feathers, and the covering feathers.

Then examine a wing and see how many joints it has, and how it unfolds and is folded, and note how the feathers lie.

Then remove a wing and spread it out on a board for better study, and name the kinds of feathers on it.

Then with a sharp knife, cut delicately through the skin over the breastbone, and fold it back and fasten it. Show the strong and thick muscles. Why does a bird want such strong muscles?

Then cut through the breastbone, or separate the breastbone and the ribs to show the hollow of the breast. Show the thin tissues in which air is collected.

Clean the upper bone of a wing, and show a small hole in it near the shoulder.

Saw through a bone lengthways and across. Show that it is hollow and that the hole in the bone admits air from the air-spaces above found, so that the duck's bones are filled with air.

The appearance and position of the lungs can be contrasted with those of a rabbit or any other mammal. Any one who has to clean and truss a chicken for roasting will not be shocked at dissecting a duck. The comparatively solid bone of a mammal can be contrasted

with those of a bird. Besides the air in the breastbones the quills of the feathers are full of air, and the close-packed outer feathers keep much air beneath them in among the down. No wonder, then, the duck swims on the surface of the water, while the dog, when he swims, has only his head out.

Now look at the shape of the body. Apart from head and neck it is oval, but not a perfect oval. It is somewhat flattened. That is, it is wider from right to left than it is deep from below to the top of its back. This flattening makes it rest more securely on the water than it would if its body were perfectly oval.

The Duck's Movements.—Notice how the duck swims. It moves its feet alternately, exactly as in walking on the land. Its feet have skin between the toes. Examine a foot. With its outstretched broad surface it fans the water. Compare the foot of a hen. Which is best for swimming? The feet push out backward and the body moves forward. Have you watched men rowing a boat? If the body moves forward when the feet are moving backward what happens when the feet are pulled in again? Does not the body move backward? Watch the feet. When they are pushed back, the toes spread out and make, with the skin between them, a broad surface. When they are pulled in, the toes draw together and curl up a little, just as happens when the duck lifts its foot in walking on dry land. Thus the foot presents as little surface as possible to the water when it is being drawn in again.

You will notice that the toes do not bend quite in the same way as our fingers do. Our fingers we bend

at our pleasure, but the duck's toes bend of themselves, and the skin folds up between them. As soon as they meet the resistance of the water in swimming, the toes and skin between them are spread out by the pressure of the water.

Now notice the position of the feet on the legs. The feet are set inwards, and are less convenient for walking on land. Compare a hen and a duck when they walk. The duck waddles. Watch the duck swim. The right foot in striking out backward pushes the body forward towards the left. The left foot similarly pushes the body forward towards the right again. Thus the body moves forward in a straight line, although neither foot pushes it quite straight forward.

Lay two books of one size flat on a table. Push them forward by shoving the end corners alternately, but push one book in a diagonal direction each time, and the other in a perpendicular direction. Contrast the movements of the two books. Which motion makes the book move more easily forward? If the duck's feet were so set on, that each stroke in swimming were made exactly in a straight line backwards, would its progress be as easy as now, when the stroke is made sideways?

The legs of the duck are short. As it swims you see only its feet. The part of the leg which is inside the skin is stout. The free part is thin and sinewy. Take a flat ruler and move it through the water broadside, first holding it by one end so that nearly all the ruler is in the water, and then holding it by the middle so that only a third of the ruler is in the water. In the second

case the ruler is moved more easily. Which case does the duck's leg resemble?

Examine the muscle of the duck's leg; its strength, size, color, and attachment. The muscle of the foot. Look at the position of the legs. They are set on towards the hinder end of the body. Some water-birds have their legs set on more in the middle, like the moorhen. On the contrary, the grebe has its legs set on still further back than a duck, and when it wants to stand it has to set its body nearly vertical or upright in consequence.

This position may be again illustrated by holding a book between the finger and thumb (*a*) horizontally and (*b*) near one end. The duck walks uneasily on land: of course because its build is contrived for its aquatic habits—look at its feathers, its toes, the length and position of its feet! The hen's legs look quite different. They are longer and more flexible. The toes are longer, being without a web. Much more of the legs is outside the skin. You can see a joint more than you can see in the duck.

Compare, however, a duck's leg and a hen's leg after separating both from the body. Show the skeleton of the two legs and compare them and contrast the upper joint of the duck's leg and the hen's drumstick.

If you hold a small book between your finger and thumb and make it walk along the table on the tips of them, the book moves more easily when you grasp it in the middle than when you grasp it near the end. Of course this can be explained by reference to mechanics if it is thought desirable. The centre of gravity should be

in a vertical line with the centre of support, or at any rate it must not be outside of it. The connection between this principle and the oval shape of the bird's body can be shown, and similarly in regard to the bend of the legs. But even without this a parallel instance leads to thoughtful observation of nature, and this leads on presently to a more accurate and quantitative study. It is possible to compare the foot of the coot or grebe, which has a fringe of web on each side of the toe, as an intermediate form between a hen and a duck.

The Duck's Food.—What does the duck do on the pond? It seeks food. Watch how it plunges its head under water and searches among the water-weeds or in the mud. Its name comes from this action. To duck is to dip the head. Besides weeds, the duck eats snails, fish, frogs, eggs, and spawn, caddis-worms, beetles, and the like.

See how long it holds its head under water without taking breath. Remember how much air it has in its body. Watch the duck raise its head from the water with its prey in its bill. It swallows the food but lets the water flow away. The duck does not want to swallow too much water. You can watch the duck drink. It only swallows a few drops while stretching out its head and neck.

We men can take a good mouthful of water. Why cannot the duck? Look at the duck's bill? There are no lips like ours. Inside its mouth you see channels and grooves crossing from side to side, and the free ends form a fringe or strainer. The edges of the

tongue have a similar fringe. These serve two purposes. They help to hold the prey firm in the beak and they help to strain the water run off it.

How can the duck find its prey in the weeds? True, as it has eyes, it, like us, can see under water, but poking about in the mud it soon makes the water thick.

Compare the hen's beak with the duck's. The hen's is pointed and hornlike. The duck's is broad and more like a skin. Now we will cut the skin from base to point down the middle. Then we will make another cut in the left side across so as to divide it into an upper and an under section. Now we will turn back to the lower section. There you will see a great number of nerves.

We men have many nerves under the skin at the tips of our fingers, and by the means of them we can tell in the dark whether we are touching a piece of bread or a stone. The duck uses its bill as we do our fingers, only far more cleverly. The blind men, however, see with their fingers.

Look at the tongue of the duck; see how thick and fleshy it is, not dry like some birds'. That helps it to get its food. Now, then, we have seen how well adapted the duck's feet and legs are for living much on the water. We now see how well its bill is constructed for the same purpose. What can you remember about its covering in this connection?

Comparison with Other Birds.—I have no space to continue about nesting and brooding, and hatching, or the development of the chick. After treating of all of these, it would be desirable to introduce the conception

of classification. By comparing the duck with geese and swans, and contrasting them with sparrows and robins, storks and cranes, you can show the difference between swimming-birds and waders and perchers.

Saturday Expeditions.—A study like this can most readily be made in the country, where the children can visit a pond frequently and watch the ducks and note their habits; but most towns possess parks with lakes on which ducks swim about. Occasional expeditions on summer evenings or Saturdays, for the purpose of investigating natural objects in their surroundings, would be well-spent time.

Too Much Science and Too Little.—If every detail that is dwelt upon is illustrated by presenting it to the eye of the children, and in many cases to the touch, such a lesson is not like a compendium of scientific facts which is learned by heart. On the contrary, the object is presented as much as possible as it lives and moves in its natural surroundings. It is not a mummified specimen out of a museum, from which all the grace and beauty of life and warmth and motion have been abstracted. A girl taught on this principle is not likely to commence a theme on her Mother with the remark, "Mother is the female parent of the child," where there is too much science. Neither would a boy when asked to describe an ordinary hen's egg answer, "An egg is an oblong white object with a shell composed of gravel," where there is too little science.

Again, the talk about the duck has not passed into a general information lesson. We have not discussed duck-shooting, decoys, and the like, neither have we

gone into the "culinary" preparation of the duck, all of which might be usefully dealt with in their place. It has been an object lesson within the meaning of that term, as I have described it in my lecture.

I have been reading the second report of the committee of the British Association on present methods of teaching chemistry, and I appreciate very keenly the excellence of the pamphlet. What there is said of chemistry is true of science. "The most," it is written, "that can be properly aimed at in teaching chemistry (I should prefer to extend the statement and say science) in elementary schools is the training of the faculties of observation and of orderly thinking, and the stimulation of the instinct of inquiry, which is the possession of every uneducated child. By restricting the teaching to common things this can easily be done, and so an interest aroused both in the phenomena of nature and in those involved in industrial operations."

What the report says of books on chemistry is true of books on other sciences. We need more books for instruction that may show how chemistry and other subjects may be approached naturally and logically from a study of common things and of every-day phenomena.

Home Teachers the Best.—The British Association Report recommends the peripatetic system of teaching science as the only one at present practical, because a high standard of scientific knowledge is absolutely necessary for the proper educative teaching of the most elementary chemistry. I incline to think myself that, where possible, it is better that all instruction should be given by some member of the school staff. I think

that a good organizing teacher, who can direct, advise, and encourage the class teachers in different schools in a district, would produce in the end more and better results than a peripatetic teacher, because the latter can never know at all intimately the number of individual scholars whom he will have to address, and can know little of the contents of their minds or how to get hold of them.

The kind of science teaching in elementary schools in Germany and Switzerland is well described in this report, where it is stated to be of the most simple and general character as distinguished from the systematic instruction for technical purposes, which begins in polytechnics and higher schools. The higher teaching demands as its basis that the elementary science lessons shall not merely have given information, but that it shall have developed intelligence, that it shall have been rational and thorough, and that it shall have been given by good teachers. I do not myself know of any peripatetic teachers in Berlin, but I met with teachers in large schools whose duty consisted entirely in teaching and superintending the teaching of science, just as one teacher often deals with needlework in England. No doubt in country districts the peripatetic system is at present often the only possible one, and also in towns where the schools are small or not large enough to occupy the whole of the time of a science teacher.

The Method more Important than the Subject.—However taught, science in its elementary stage must be of the nature of object teaching. The subject may consist of a connected series of object lessons in a particular

study, such as many teachers are now devising in domestic economy, physiology, mechanics, and physics, or the field of inquiry may be more general, or the teaching may be applied to history or social science; but the real worth of this study of objects is not the quantity of ground covered and information imparted, but the quality and method of instruction. The observations must be made or verified by the scholars themselves, who are thus trained to use and trust their own senses and powers of inference instead of repeating other people's descriptions or accounts in books.

This kind of object teaching is an antidote to the degradation of learning, which we all know and deplore, but can never wholly escape. After a full and living description of an object the teacher writes down a few of the salient points in his development, which of course prove of immense value first to the examinee and afterwards to the examiner. The next step is that, in order to save time, the full account is omitted in teaching, and the dry bones of the skeleton are studied exclusively by the student as his sole weapon of defence against the examiner, and he abandons all hope of taking any interest in his studies except as means to a pass. It only remains for me to express my obligations in writing this paper to two German authors—Karl Richter, whose excellent treatise on Object Teaching has been the principal source for the first part of it; and Friedrich Junge, whose book, called "The Village Pond," has supplied me with materials for the second part.

QUESTIONS.

1. How far is it true to say that the senses are the gateways of knowledge?

2. Is the study of things rightly opposed to the study of words?

3. What is meant by saying that an object must be studied by analysis?

4. How does speech aid in the process of analyzing an object?

5. In what way may speech be regarded as the outward expression of an inward mental process?

6. What kind of use of words renders them "significant" to the speaker?

7. "The word has a double nature." Explain what this double nature is.

8. Show that a name is a summary of our knowledge of an object.

9. What light does this study of words throw upon the evolution of the meaning of words?

10. Recapitulate the uses of the word in studying an object.

11. Why are good object lessons also good language lessons?

12. Why is it desirable that every one should learn a second language besides his mother tongue?

13. Show the importance of getting correct impressions from objects.

14. How may inexact impressions lead to inexact reasoning?

15. "Want of words filled with clear definite meaning is the greatest hindrance to culture." Illustrate this.

16. In object lessons why is the method of instruction more important that the amount of information?

17. Show that object teaching demands time and cannot be a hasty process.

18. How may drawing and modelling assist object teaching?

19. What is the difference between object teaching and information lessons?